

Name: _____

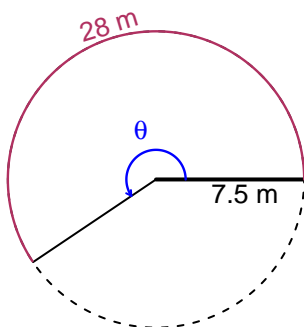
Date: _____

Trig Final (SLTN v631)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 28 meters. The radius is 7.5 meters. What is the angle measure in radians?

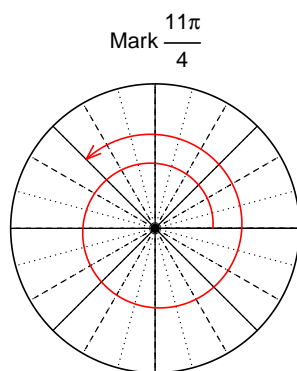


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 3.733$ radians.

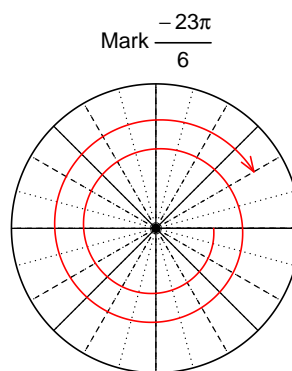
Question 2

Consider angles $\frac{11\pi}{4}$ and $-\frac{23\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(-\frac{23\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/4)$

$$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$$



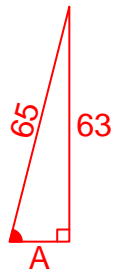
Find $\sin(-23\pi/6)$

$$\sin(-23\pi/6) = \frac{1}{2}$$

Question 3

If $\sin(\theta) = \frac{63}{65}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

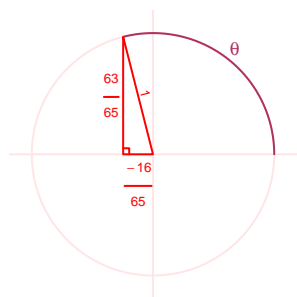
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 63^2 &= 65^2 \\A &= \sqrt{65^2 - 63^2} \\A &= 16\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-16}{65}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 8.5$ meters, a frequency of 3 Hz, and an amplitude of 6.49 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.49 \sin(2\pi 3t) + 8.5$$

or

$$y = 6.49 \sin(6\pi t) + 8.5$$

or

$$y = 6.49 \sin(18.85t) + 8.5$$